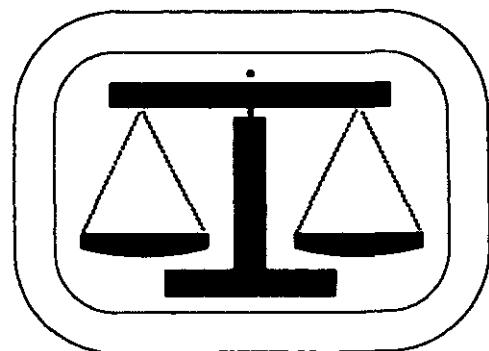


Seismic Reflection Survey
for
Simplex Pier Dredging Project
located in
Newington, New Hampshire
Prepared for
New England Division
U.S. ARMY CORPS OF ENGINEERS
424 Trapelo Road
Waltham, MA 02254
26 July 1982



BRIGGS

SEISMIC REFLECTION SURVEY
SIMPLEX PIER DREDGING PROJECT
PISCATAQUA RIVER
NEWINGTON, NEW HAMPSHIRE

Prepared for
BRIGGS ENGINEERING & TESTING COMPANY

July 1982



Weston Geophysical
CORPORATION

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1.0 INTRODUCTION AND PURPOSE

A seismic reflection survey was conducted for Briggs Engineering & Testing Company under U.S. Army Corps of Engineers contract, on the Piscataqua River in the vicinity of the Simplex Wire and Cable Company pier in Newington, New Hampshire during the period of May 19, to May 21, 1982.

The purpose of this survey was to determine the depth to rock in the site area prior to dredging operations. The rock surface profiles shown on the reflection data are to be used to determine the number and locations of borings to be made at the site as well as provide information on thicknesses and layering of materials overlying rock.

The area of investigation and survey lines were established by the U.S. Army Corps of Engineers and shown as Attachments 2 and 3 in the GEB Requisition No. 82-24. Field operations conducted by Weston Geophysical were coordinated with Mr. David S. Campbell of Briggs Engineering.

The survey consisted of 14 lines each approximately 900 feet in length. Two additional lines, each approximately 400 feet in length, were run southwest of the caissons that exist downstream of the Simplex pier.

2.0 LOCATION AND SURVEY CONTROL

The survey area is shown on the area of investigation map, Figure 1. This map is a section of the Portsmouth, New Hampshire-Maine 7 1/2 minute quadrangle sheet.

Horizontal location control and river elevation data for this survey were provided by Briggs Engineering. The plan map of seismic reflection lines, Figure 2, was provided to Weston Geophysical by Briggs Engineering.

3.0 METHOD OF INVESTIGATION

The seismic investigation consisted of continuous reflection profiling; the energy source used was an electro-mechanical transducer (or "Boomer") with a peak frequency of approximately 500 hertz and an output energy of approximately 200 joules. The "Boomer" source results in high quality, high resolution data. From this data the various overburden layers and the basement reflection can be defined. The speed of the boat was kept at an average rate of approximately one knot for all lines of investigation; it appears to have varied in a narrow range of .8 to 2.0 knots. Refer to Appendix A for additional information on the marine reflection technique and associated geophysical equipment.

4.0 PRESENTATION OF RESULTS

The results of the survey are presented as profiles, (Figures 3 through 9). These figures are reproductions of the reflection records obtained in the field. Records have been enhanced to show major reflecting interfaces detected down to the basement material. It should be noted that the depth scale shown on these profiles is based on a seismic velocity value of 5,000 ft/sec, which generally corresponds to saturated overburden materials. The height of the tide above MLW, at the

time of coverage, is shown above the depth scale on the line profiles. The horizontal scale is dependent on boat speed along the course of each survey line. The scale is variable but it is reasonable to assume a consistent scale between any two consecutive survey control points.

5.0 DISCUSSION OF RESULTS

The records obtained by the seismic reflection profiling system are a representation of the bottom and subbottom related to the travel time of the transmitted and reflected signals. The various reflecting interfaces detected are time related. Time relationship can be converted to depth if seismic velocity values are determined for the various layers detected. Seismic velocity measurements were not made during the course of the survey. A velocity value of 5,000 ft/sec, for the water column and overburden materials was used, in this study, to determine the depth to the "acoustic basement". This velocity value is the minimum value that would be expected for the overburden materials detected. If any material in the overburden sequence has an actual seismic velocity greater than 5,000 ft/sec the depths will be greater.

From reflection recordings identification of "acoustic basement" as rock can be conclusive only where seismic refraction measurements are made, or where borings are drilled to rock for correlation. Identification of "acoustic basement" based on the character of reflection returns is therefore

tentative and subjective. Reasonably smooth horizons are interpreted as overburden type surfaces; irregular horizons, especially when covered by little or no overburden, are interpreted as rock.

The line shown on the reflection profiles (Figures 3 through 9), designated as the "acoustic basement", is interpreted as the rock interface.

5.1 Field Conditions

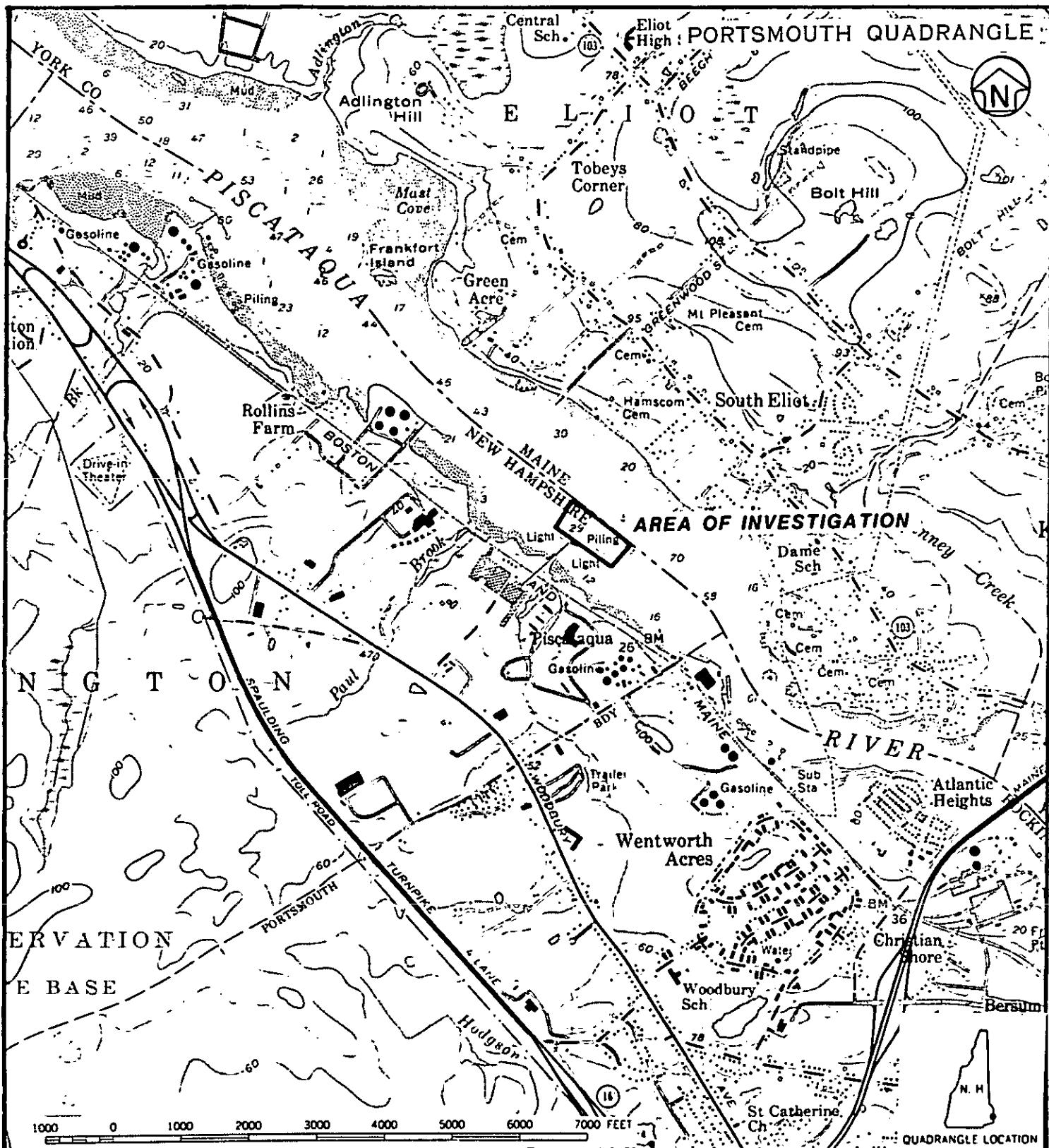
Coverage on lines 1 and 2, as shown on the Army Corps document GEB Requisition No. 82-24, Attachment 3, was not possible because of a ship docked at the pier and the presence of caissons downstream of the pier.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this survey indicate that the rock surface is generally in the depth range of 45 to 75 feet below mean low water (MLW) over most of the survey area. The data shows that the rock depths generally decrease toward the downstream boundary of the area. The approximate depth to rock is less than 45 feet on lines 1A, 2A and the downstream end of line 1. Rock depths less than 45 feet below MLW are also detected on the downstream end of lines 2, 3 and 4.

The shallowest depths to rock were detected in the southeasterly positions of this survey coverage. Borings are recommended for verification of depths to rock in the area of this investigation. A particular location for such correlation is the position of shallowest rock, as noted in the above paragraphs.

FIGURES



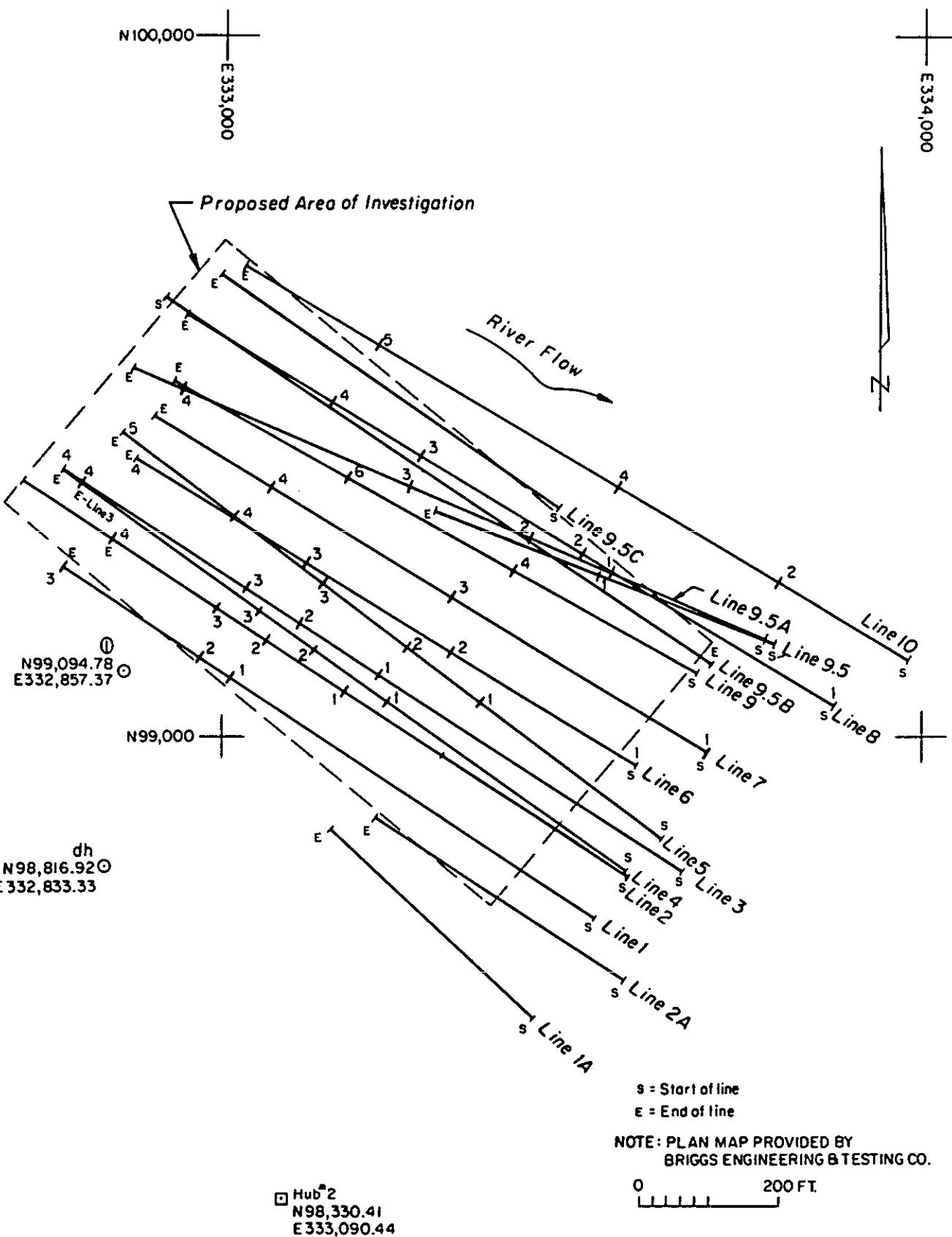
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PISCATAQUA RIVER
NEWINGTON, N. H.
for
BRIGGS ENGINEERING & TESTING CO.**

AREA OF INVESTIGATION

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FIGURE 1



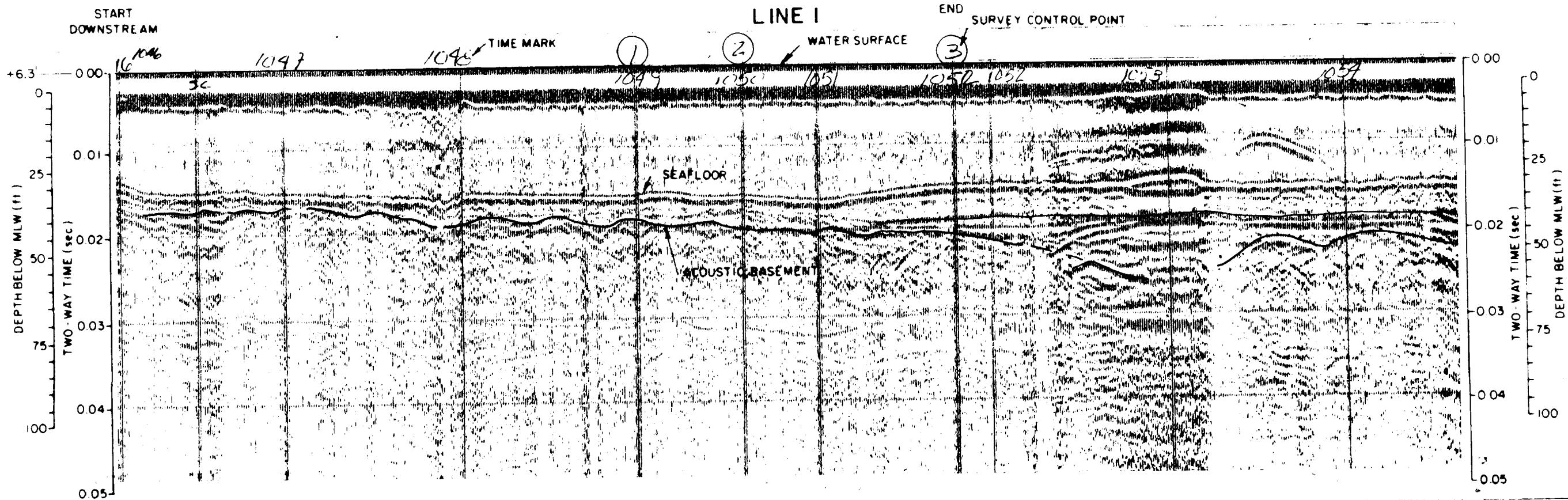
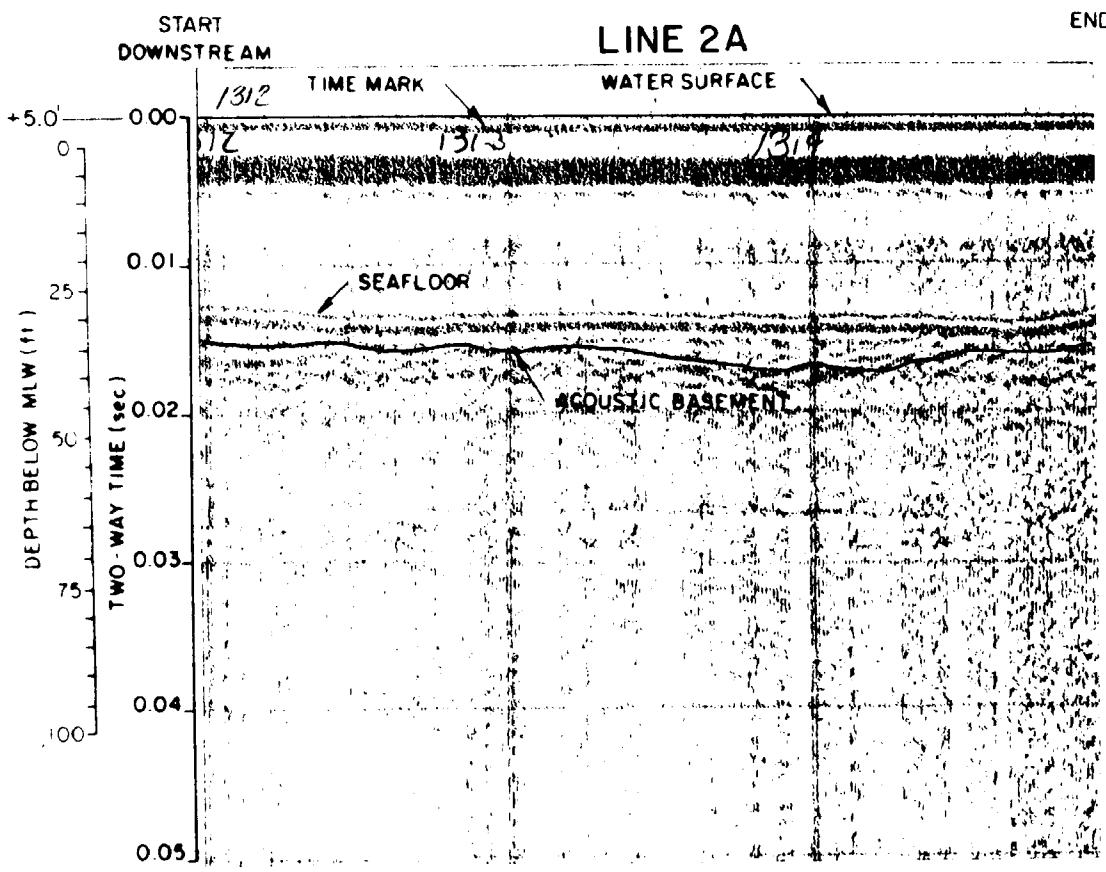
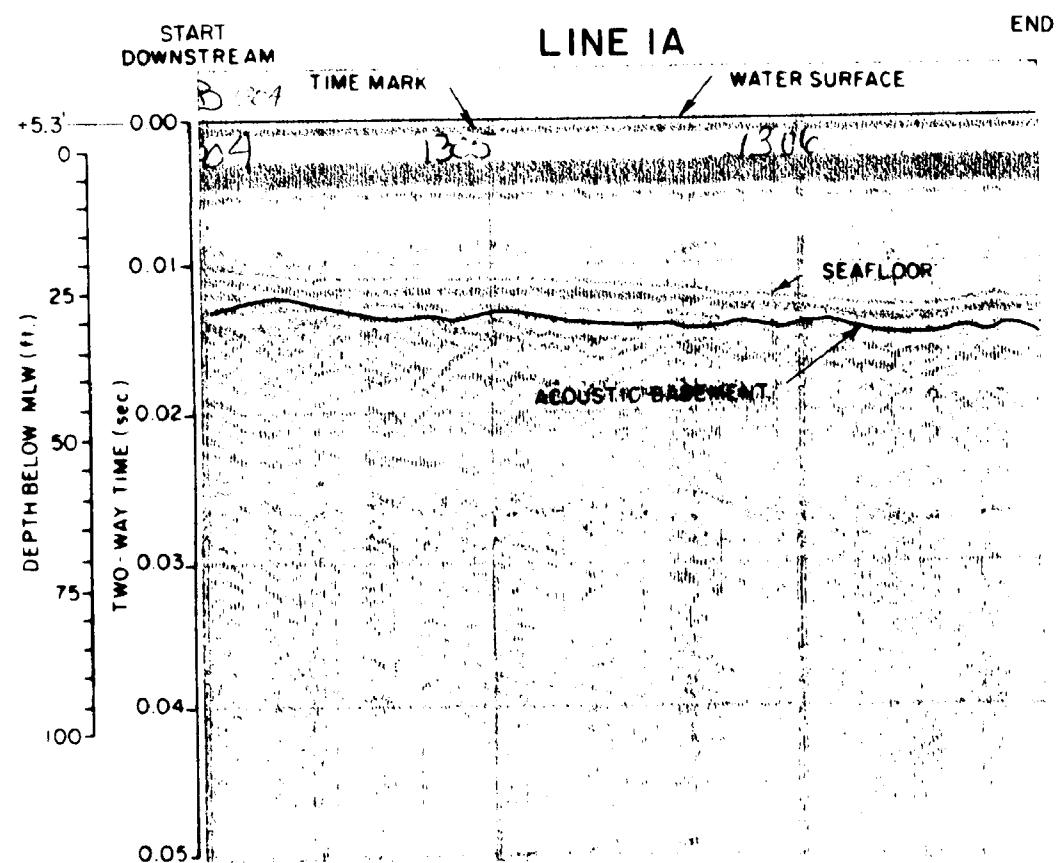
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PLAN MAP

WESTON GEOPHYSICAL CORP.

FIGURE 2



NOTE: HORIZONTAL SCALING IS ASSUMED TO BE
CONSTANT BETWEEN ANY TWO CONSECUTIVE
SURVEY CONTROL POINTS.

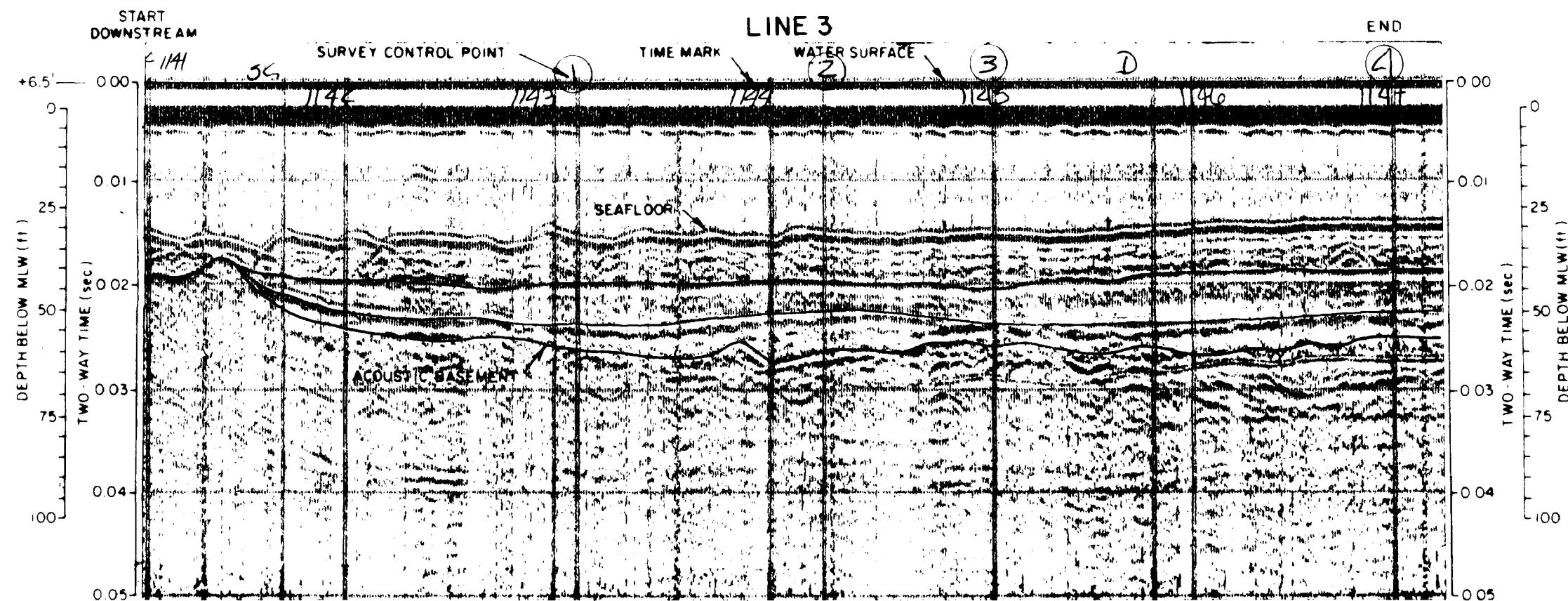
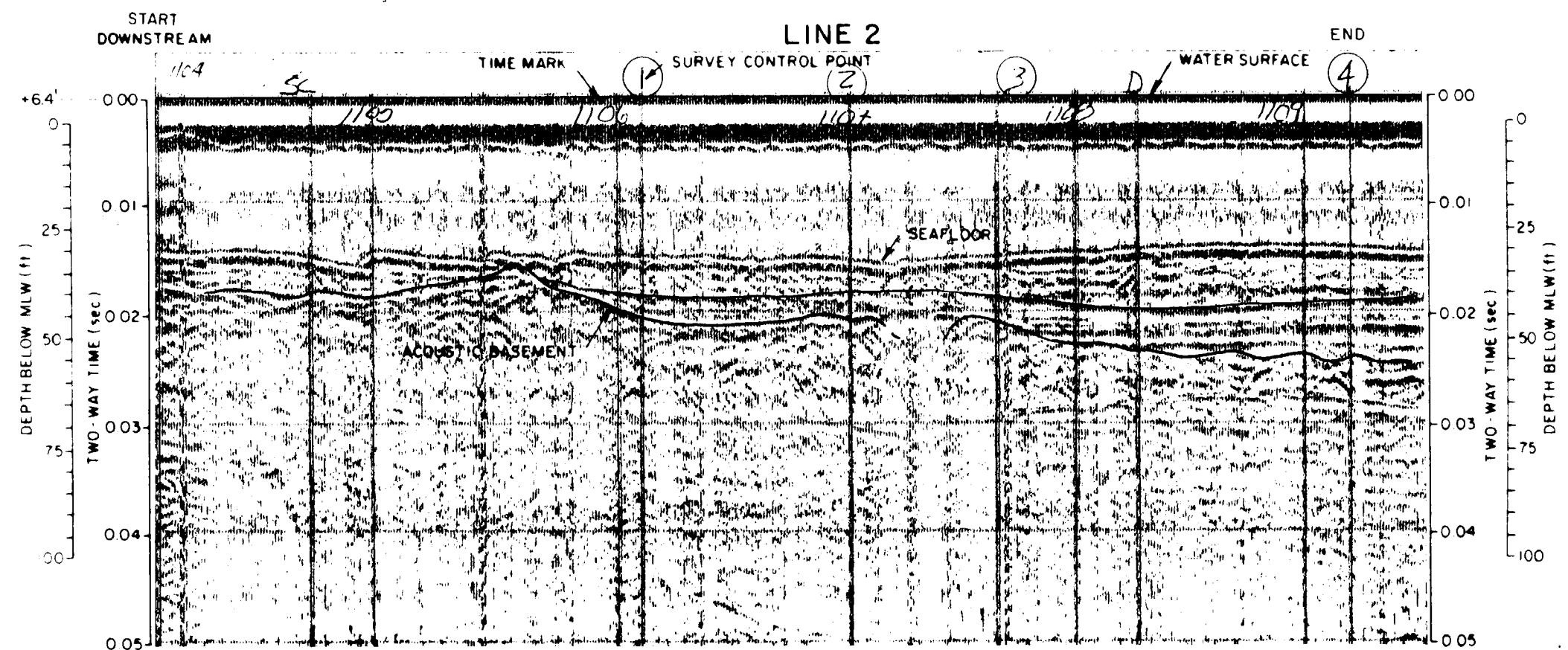
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SEISMIC REFLECTION PROFILES-
LINES 1A, 2A, and 1

WESTON GEOPHYSICAL CORP.

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FIGURE 3



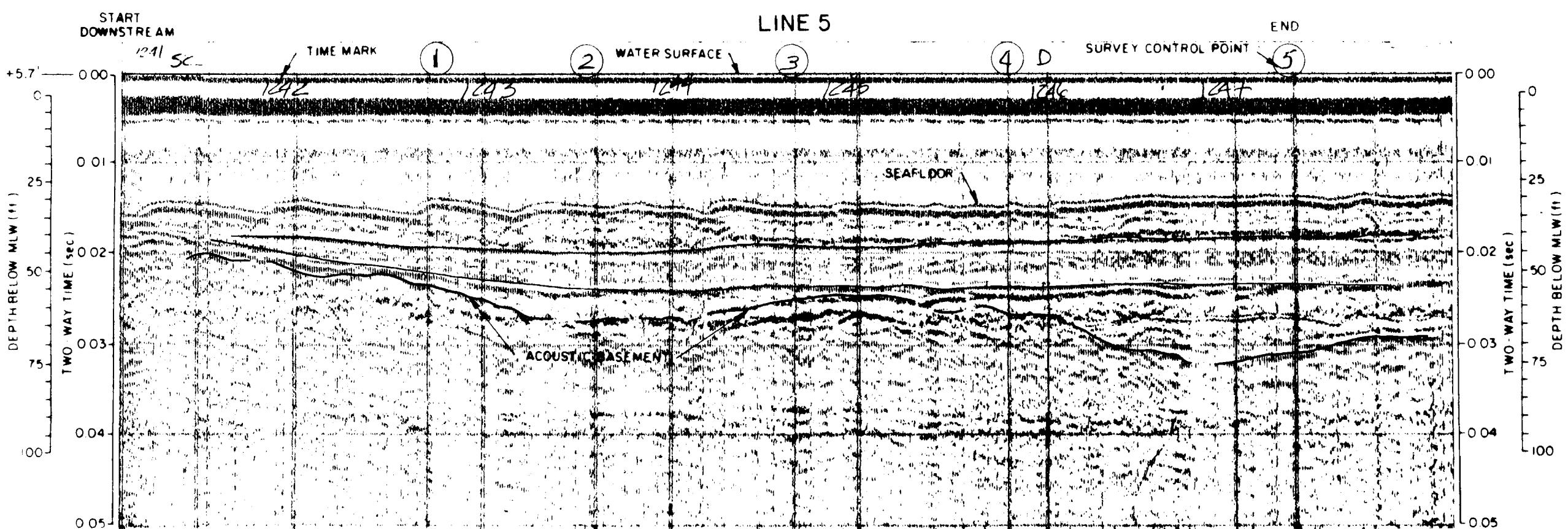
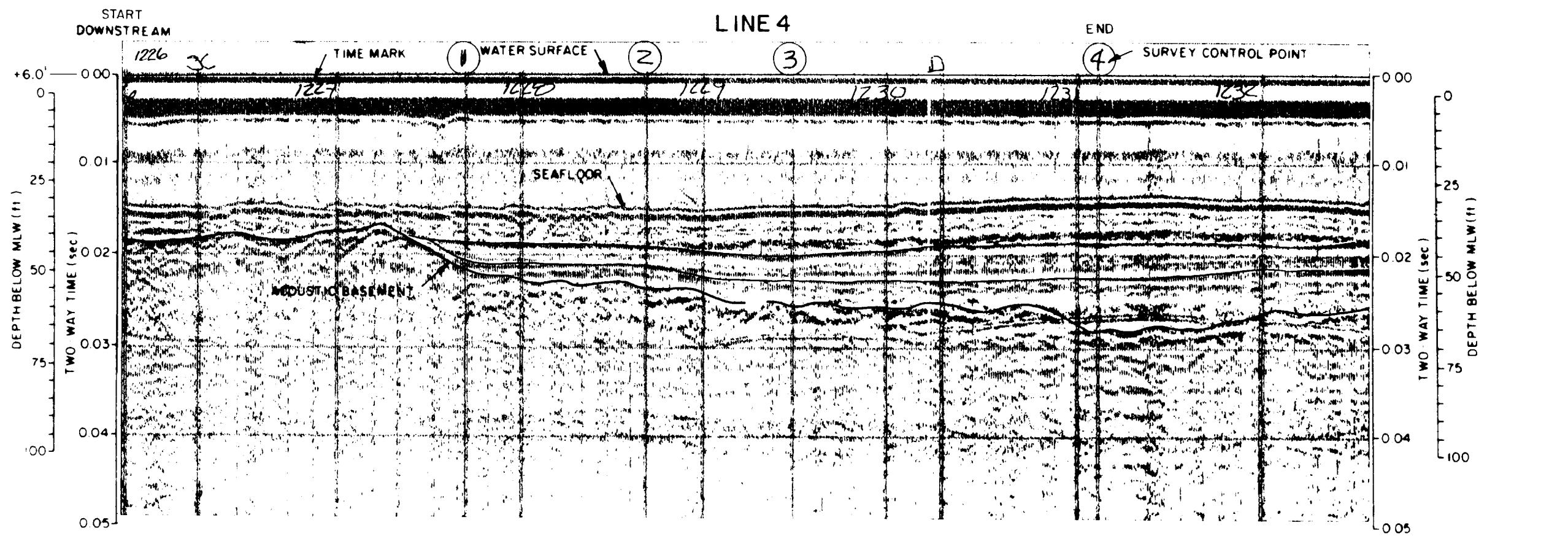
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SEISMIC REFLECTION PROFILES-
LINES 2 and 3
WESTON GEOPHYSICAL CORP.

JULY, 1982

FIGURE 4



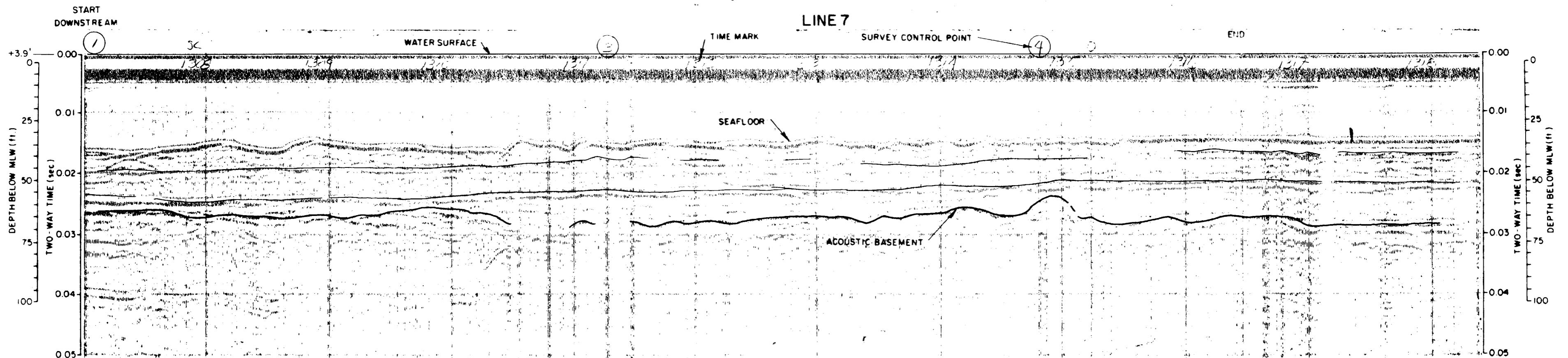
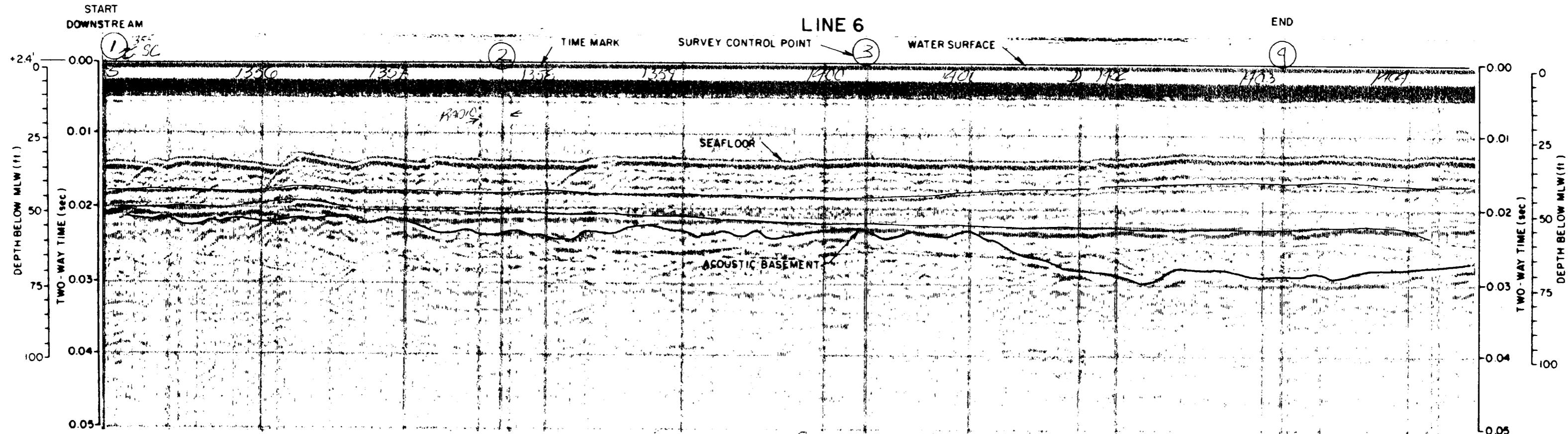
NOTE: HORIZONTAL SCALING IS ASSUMED TO BE
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SEISMIC REFLECTION PROFILES-
LINES 4 and 5
WESTON GEOPHYSICAL CORP.

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FIGURE 5



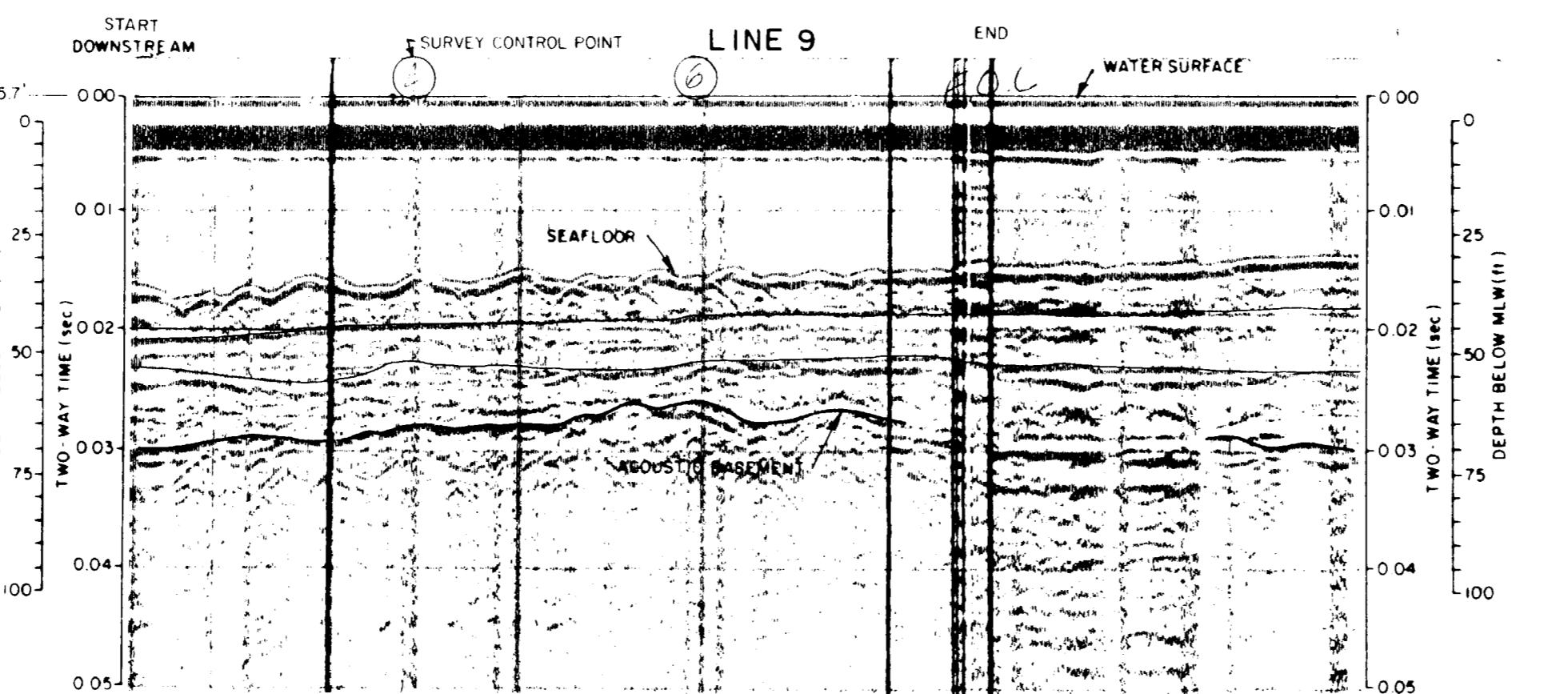
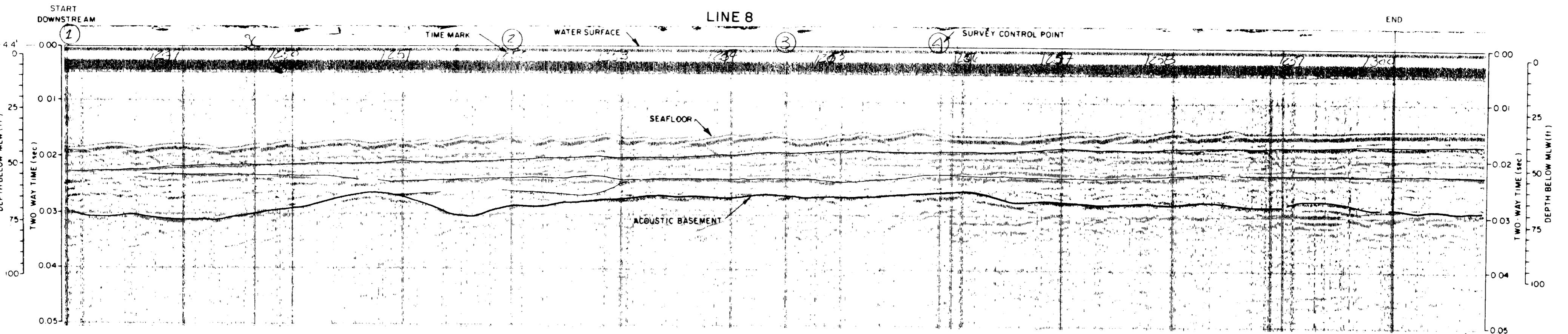
NOTE : HORIZONTAL SCALING IS ASSUMED TO BE
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SEISMIC REFLECTION PROFILES-
LINES 6 and 7

WESTON GEOPHYSICAL CORP.

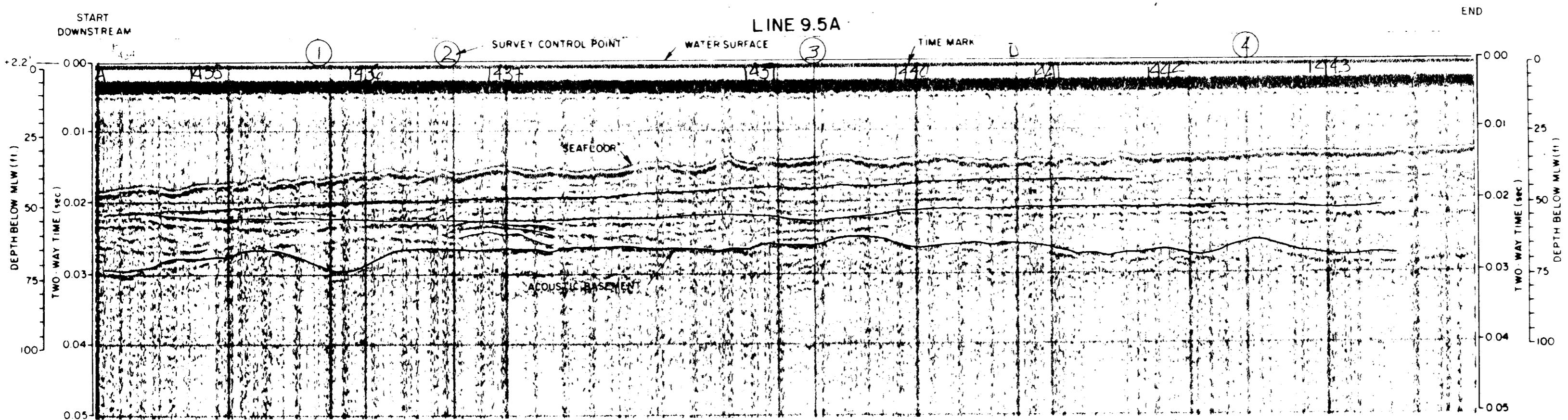
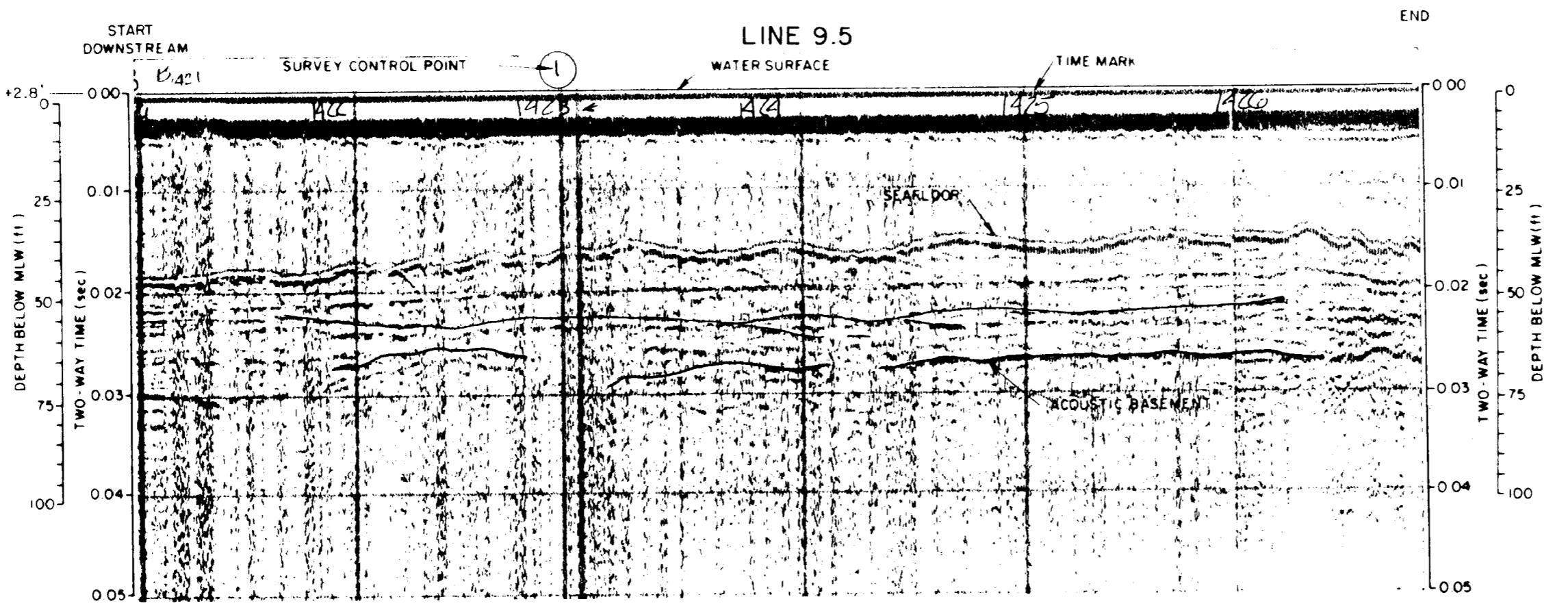
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NOTE : HORIZONTAL SCALING IS ASSUMED TO BE
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EISMIC REFLECTION PROFILES-
LINES 8 and 9

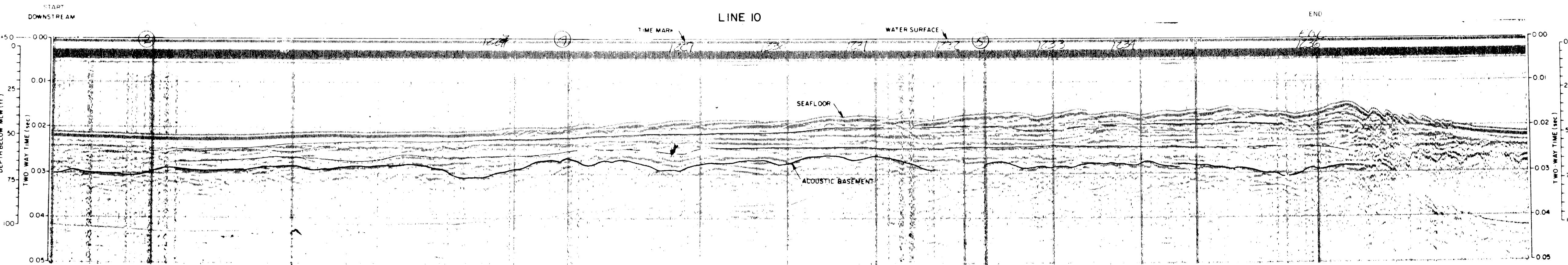
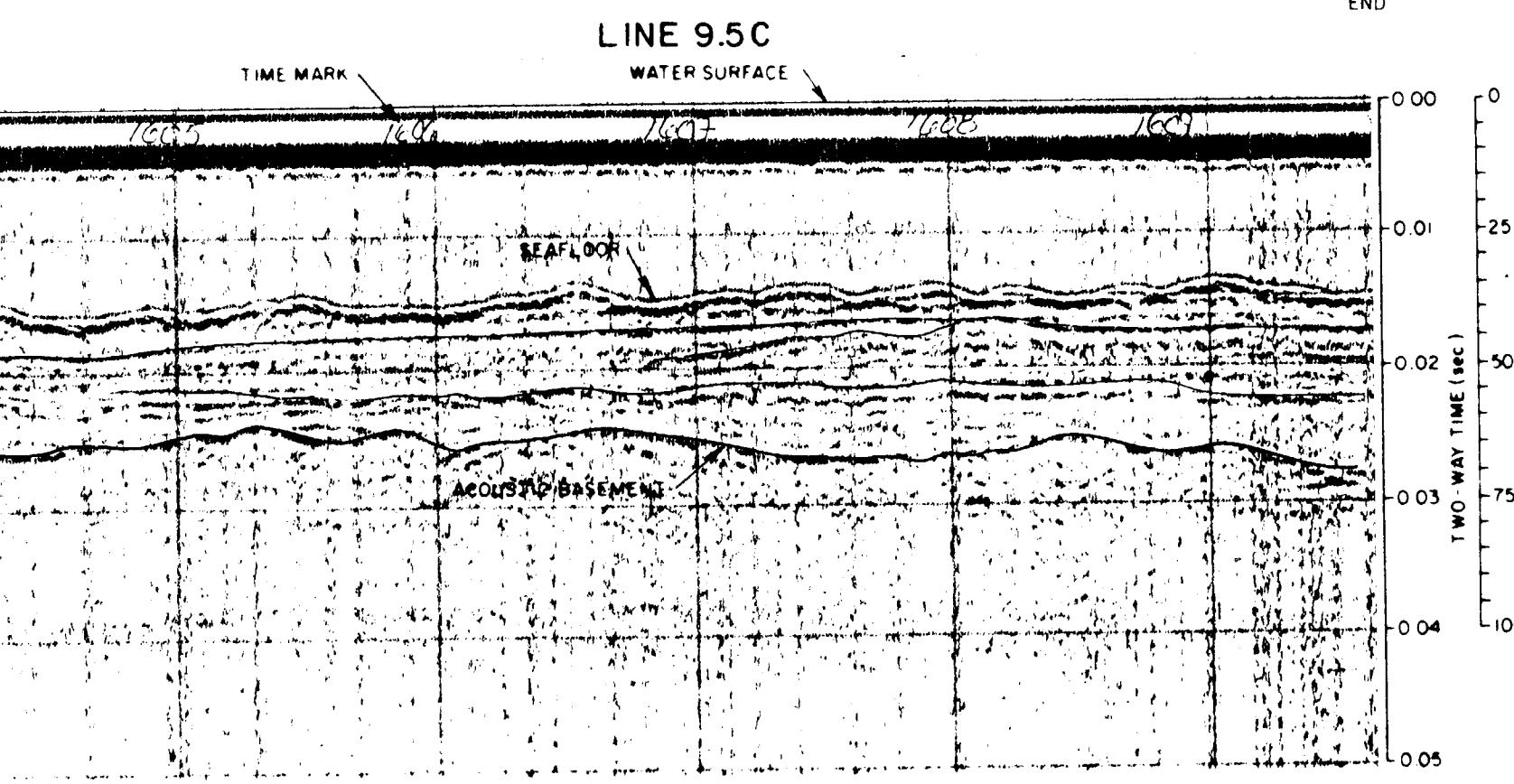
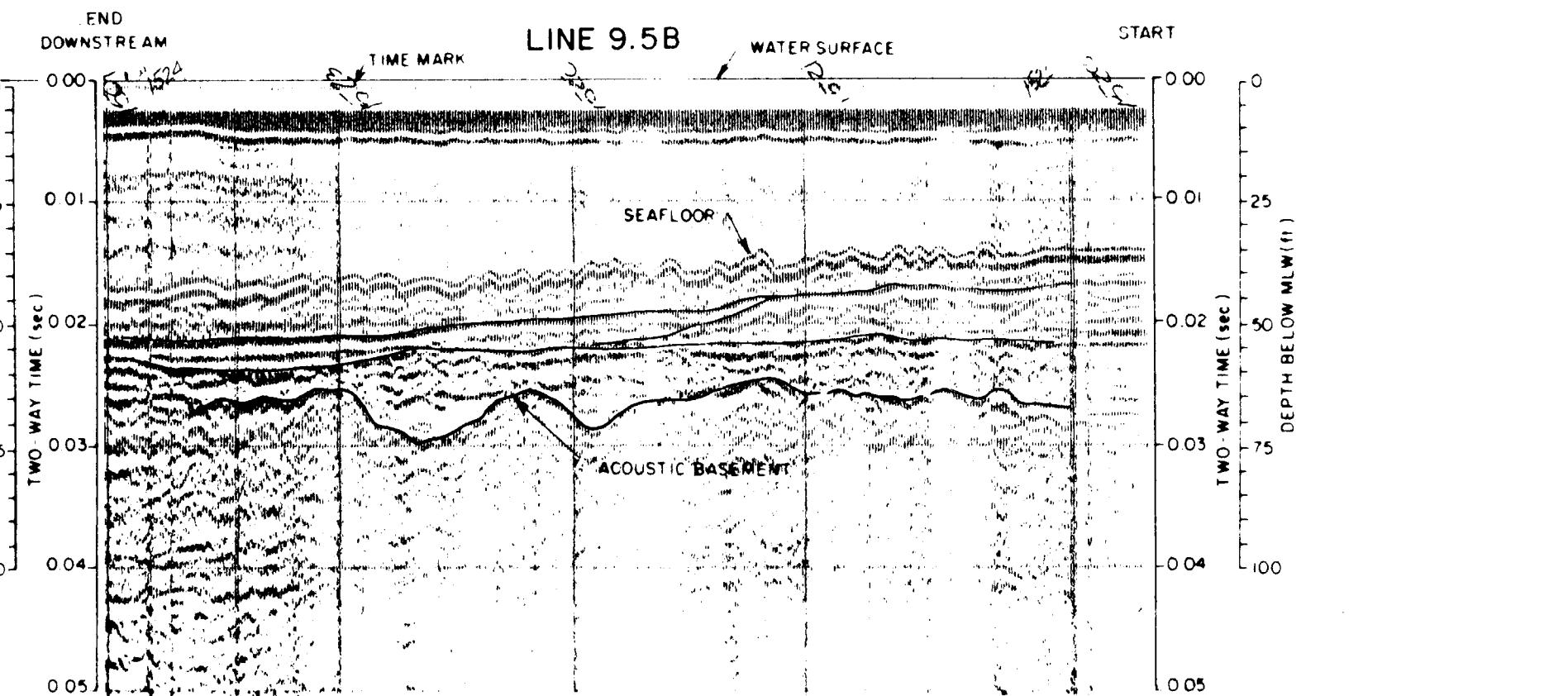


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SEISMIC REFLECTION PROFILES-
LINES 9.5 and 9.5A
WESTON GEOPHYSICAL CORP.

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SEISMIC REFLECTION PROFILES-
LINES 9.5B, 9.5C, and 10
WESTON GEOPHYSICAL CORP.
JULY, 1982

APPENDIX A
MARINE INVESTIGATION

APPENDIX A

MARINE INVESTIGATION

Continuous Seismic Reflection Survey

(Including Fathometer Survey)

The continuous seismic reflection method (Figure A-1) utilizes an energy source and receiver array. For the present work, we used a continuous seismic profiling system used by Weston on numerous marine engineering projects. This proven system is comprised of an EPC Model 4100 graphic recorder, an EPC "Boomer," and an 20 element streamer. Part of the energy transmitted from the source is reflected from various horizons (bottom and subbottom); the returning reflection arrivals are displayed as a continuous graph with distance in one direction and time in the other. For the continuous recording fathometer, the record is similar except that no penetration is achieved through the bottom, and the reflection is that of the water-bottom interface only.

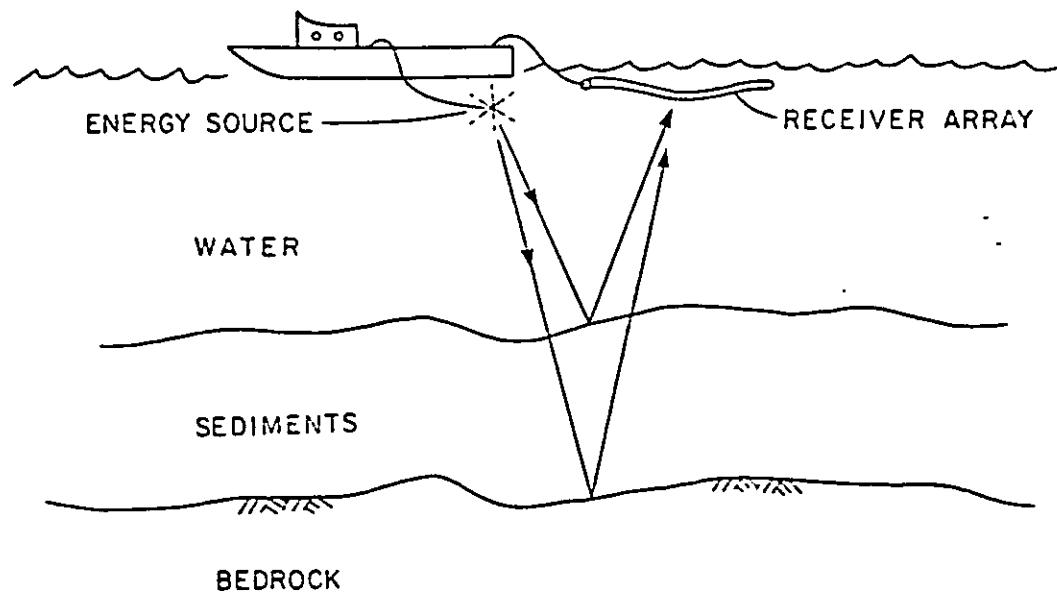
These devices are very useful tools for profiling continuously over a wide area. They effect a great deal of coverage in a short period of time and allow one to determine detail on bottom and subbottom horizons that would otherwise be impossible.

The energy in the reflected pulse is a function of both the seismic velocity contrast across the interface, which is acting as a reflector, and the density contrasts of the reflecting

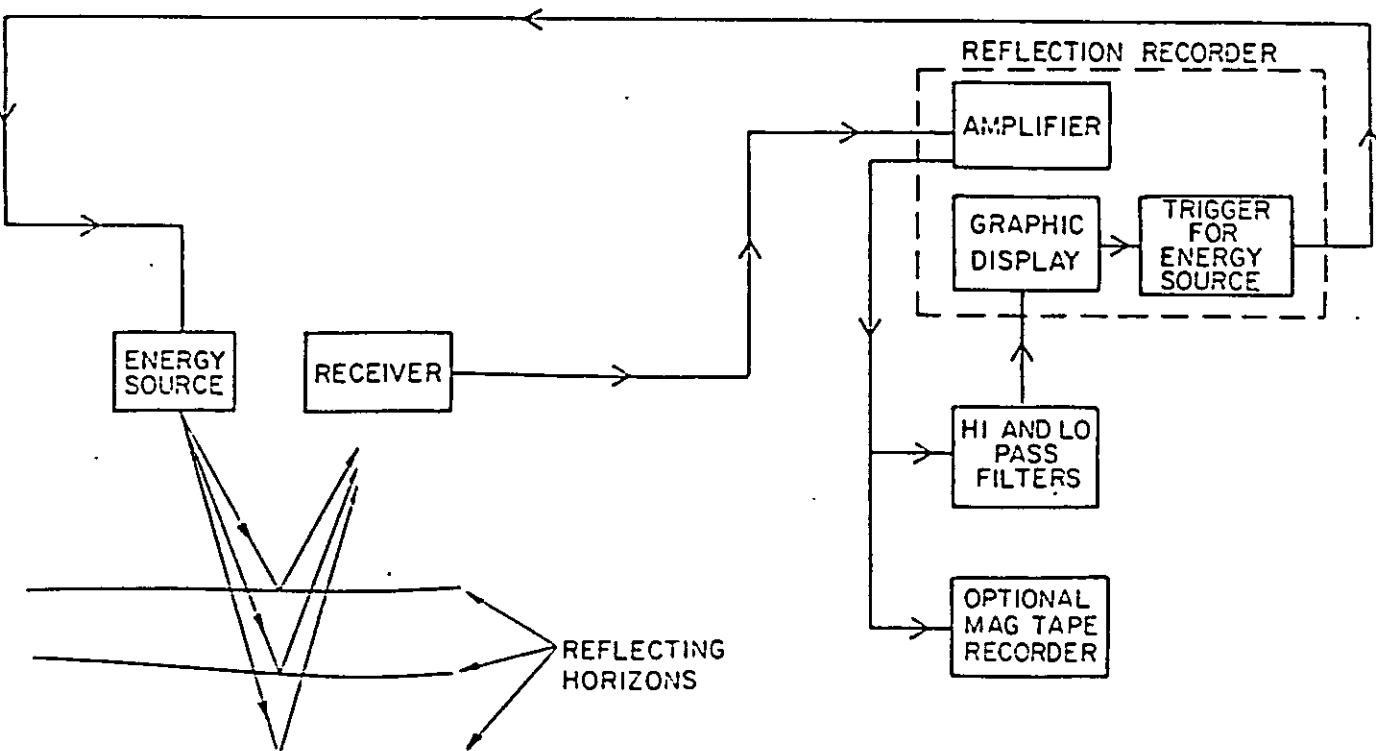
layers. These two parameters determine the acoustic impedance at the interface between two layers. Thus, layers with the same compressional velocity, for example, the water layer overlying a layer of saturated sandy material or a layer of saturated silty or clayey material, will show up on the continuous reflecting device even though the velocity of the seismic wave through these three materials is identical at 5,000 ft/sec. The reflection takes place because the density contrast between the materials is sufficient to produce a reflected wave at each one of the interfaces.

The continuous recording fathometer measurements complement the seismic program by simultaneously determining water depths, which are directly converted to water-bottom elevations.

Because the reflection method itself simply measures the time for the outgoing pulse to go through the various strata and return to the detector, it does not measure the velocities of the materials through which the signal travels.



a. GEOMETRY OF SEISMIC WAVE RAY PATH



b. INSTRUMENTATION

SEISMIC REFLECTION METHOD
FIGURE A-1